

2.—The genus *Sphenomorphus* (Lacertilia, Scincidae) in Western Australia and the Northern Territory

by G. M. Storr*

* Western Australian Museum, Perth, Western Australia.

Manuscript received 21 September 1965; accepted 23 November 1965.

Abstract

Mittleman's concept of *Sphenomorphus* has been amended by including certain species that he placed in *Lygosoma* and by excluding species recently transferred to *Ctenotus*. The following species and subspecies are defined and keyed: *richardsoni* Gray (including *monotropis* Boulenger and *ambiguus* De Vis), *f. fasciolatus* Günther (including *intermedius* Sternfeld), *f. pallidus* Günther, *i. isolepis* Boulenger (including *forresti* Kinghorn), *i. douglasi* nov., *australis* Gray (including *gracilipes* Steindachner but not "*Sphenomorphus australis* (Gray)" of Loveridge), *crassicaudus arnhemicus* nov., and *c. darwiniensis* nov. A neotype has been proposed for *Lygosoma australis* Gray.

Introduction

Under the long-forgotten but older name *Sphenomorphus*, Malcolm Smith (1937) restricted Boulenger's (1887) concept of *Hinulia* by removing several southeast Asian species to the revived genus *Otosaurus*, and broadened it by including certain weak-limbed (but pentadactyl) skinks that had been wrongly placed in *Omolepida*. Smith's treatment of the Australian "Omolepida" was not consistent: *australe* alone was placed in *Sphenomorphus*; the closely related *crassicaudum* was transferred to *Ictiscincus*, and *pumilum*, *punctulatum* and *mjobergi* to *Lygosoma*.

Mittleman's (1952) concept of *Sphenomorphus* was generally similar to Smith's. His main departure was to synonymise *Ictiscincus* with it; *crassicaudum* was thus transferred to *Sphenomorphus*, while its relatives, *punctulatum* etc., remained segregated in *Lygosoma*.

As the present paper is only concerned with part of the range of *Sphenomorphus*, my views on the limits of the genus are not relevant here. However, several species included in *Hinulia* by Boulenger, and in *Sphenomorphus* by both Smith and Mittleman, were recently transferred to *Ctenotus* (Storr 1964).

* Neither of these authors cites the authority for this designation. The choice was ill-advised but evidently valid. The biological species *quoyi* was not among the several species originally included by Gray in *Hinulia*. However the nominal species *quoyi* was among them by virtue of Gray's placing it in the synonymy of *Tiliqua reevesi*, an included species. That Gray's synonymy was grossly erroneous, is irrelevant according to my reading of the Code (1961: 69).

Elania J. E. Gray, 1845, 'Cat. Specimens Liz. Brit. Mus.', p.80. Type-species: *Scincus muelleri* Schlegel [by monotypy].

Ictiscincus M. A. Smith, 1937, Rec. Ind. Mus. 39: 22. New name for *Elania* Gray.

The following survey was based on material in the Western Australian Museum (numbers prefixed with R), in the collections of the Animal Industry Branch, Northern Territory Administration, Alice Springs (numbers prefixed with NTM), in the collection made by W. H. Butler jointly for the W.A.M. and A.M.N.H. (indicated by WHB), and in the South Australian Museum (number prefixed with SAM).

Genus *Sphenomorphus* Fitzinger

Sphenomorphus Fitzinger, 1843, 'Systema Reptilium', p.23. Type-species: *Lygosoma melanopogon* Duméril & Bibron [fide Smith (1937) and Mittleman (1952)].

Eulamprus Fitzinger, 1843, 'Systema Reptilium', p.22. Type-species: *Lygosoma quoyi* Duméril & Bibron [fide Smith (1937) and Mittleman (1952)].

Hinulia J. E. Gray, 1845, 'Cat. Specimens Liz. Brit. Mus.', p. 74. Type-species: *Lygosoma quoyi* Duméril & Bibron [fide Smith (1937)* and Mittleman (1952)*].

Diagnosis. Limbs pentadactyl. Tail fragile, longer than head and body. No supranasals. Eyelid moveable, without a transparent disc. Tympanum sunken. Parietals in contact behind interparietal. Distinguishable from *Ctenotus* by thick tail, swollen supraocular region, absence of auricular lobules and of bold longitudinal striping, and crepuscular (if not nocturnal) way of life.

Distribution. From tropical Africa through southern Asia to Australia and New Zealand.

General description (of species in this paper). Habitus small to moderately large, elongate or stout. Limbs weak to moderately strong, adpressed hind-leg never reaching to axilla and sometimes falling far short of it. Digits not or slightly compressed, short to moderately long, each bearing a long, sharp claw. Ear aperture smaller than eye, with or without granules projecting back from anterior margin. Tail (when original) 1.3-1.9 times as long as head and body, but usually regenerated.

Frontonasal invariably in contact with rostral and nearly always with frontal. Prefrontals well developed. Frontal long and narrow, kite-shaped with long sides concave, about as long as frontoparietals and interparietal together, considerably narrower than supraocular region. Frontoparietals paired, longer or shorter than free interparietal. Supraoculars 4; first two broadly, and third not or very narrowly, in contact with frontal. Supraciliaries 5-9, first invariably largest. Loreals 2, posterior larger. Preoculars 2, lower larger. Suboculars 4 or 5, anterior two or three separated from posterior two by third-last labial. Temporals normally

3; single primary smallest; upper secondary oblong, much longer than wide, broadly in contact with parietal; lower secondary about as large as last two labials, its posterior edge broadly in contact with long, vertically narrow scale that Copland (1945) calls a tertiary temporal (it is probably formed by fusion of two transversely adjacent lateral scales, in same way as enlarged nuchals). Upper labials 6-9; last two largest; third-last alone entering orbit (second-last and fourth-last precluded by posterior and anterior suboculars respectively). No occipitals. Nuchals 0-4 on each side (including large oblique scales bordering parietal, as well as dorsal scales transversely enlarged by fusion of anteriormost vertebrae with adjacent paravertebrals). Midbody scales in 19-36 longitudinal rows; dorsals smooth or obtusely uncarinate. Two preanal scales slightly to moderately enlarged. Subdigital lamellae entire or divided, smooth or weakly keeled. 15-29 under fourth toe.

Key

- | | | | |
|----|--|---|---------------------------|
| 1. | Midbody scale rows more than 24; adpressed limbs overlapping or failing to meet by less than length of fore-leg | 2 | |
| | Midbody scale rows fewer than 24; adpressed limbs failing to meet by more than length of fore-leg | 6 | |
| 2. | Supracaudals (and often dorsals) keeled; dorsum and/or sides banded with dark brown | 3 | |
| | Supracaudals and dorsals not keeled; dorsum and/or sides spotted with dark brown; sutures between upper labials broadly margined with dark brown | 5 | |
| 3. | Bands on back and tail sharply defined, as broad or almost as broad as pale interspaces, fewer than 13 on body and 30 on tail; upper labials usually 8 | | <i>S. richardsoni</i> |
| | Bands on back and tail much narrower than pale interspaces, more than 10 on body and 30 on tail; upper labials usually 7 | 4 | |
| 4. | Bands more conspicuous on back than on flanks | | <i>S. f. fasciolatus</i> |
| | Bands less conspicuous on back than on flanks | | <i>S. f. pallidus</i> |
| 5. | Broad blackish dorsolateral streak on anterior part of body, usually dotted with white; upper labials usually 6 | | <i>S. i. douglasi</i> |
| | No anterior dorsolateral streak (if dark spots are concentrated dorsolaterally it is for whole length of body and never so densely as to form solid streak); upper labials usually 7 | | <i>S. i. isolepis</i> |
| 6. | Flanks spotted with white; 3 anterior suboculars; usually 6 postoculars | | <i>S. australis</i> |
| | Flanks not spotted with white; 2 anterior suboculars; usually 5 postoculars | 7 | |
| 7. | Dorsum unstriped, dotted with dark brown, not sharply demarcated from densely spotted sides; more than 18 lamellae under fourth toe | | <i>S. crassicaudus</i> |
| | Broad pale brown paravertebral stripe, sharply demarcated from dark flanks and vertebral stripe; fewer than 18 lamellae under fourth toe | | <i>arnhemicus</i> |
| | | | <i>S. c. darwiniensis</i> |

Sphenomorphus richardsoni (Gray)

Hinulia richardsonii J. E. Gray, 1845, 'Cat. Specimens Liz. Brit. Mus.', p.271. Houtman Abrolhos, Western Australia (B. Bynoe).

Lygosoma monotropis Boulenger, 1887, 'Cat. Liz. Brit. Mus.' 3: 237. Champion Bay, Western Australia (F. H. du Boulay).

Hinulia ambigua De Vis, 1888, Proc. Linn. Soc. N.S.W. (2) 2: 817. Charleville, Queensland.

Diagnosis. Moderately large and stout *Sphenomorphus* whose adpressed limbs overlap or fail to meet by less than length of fore-leg. Distinguishable from *S. isolepis* by keeling of supracaudals (and often of dorsals) and by numerous dark bands across body and tail, and from *S. fasciolatus* by bands across body and tail being fewer and about as wide as pale interspaces.

Distribution. Western Australia from south Kimberley and Warburton and Blackstone Ranges south to Wheat-Belt, Eastern Goldfields and Nullarbor Plain; east through northern South Australia to southwestern Queensland.

Description. Fore-leg 22-33 (av. 27.2) and hind-leg 29-45 (36.8) % of SVL (snout-vent length). Digits moderately long and slender, moderately or weakly compressed; fourth finger slightly longer than third. Tail 1.32-1.71 (1.52) times as long as SVL in the few (ca 20%) specimens with original tail. Ear aperture vertically elliptical or subcircular, about half as large as eye, margined anteriorly with 0-4 granules. Maximum SVL 113 mm.

Nasals usually widely (rarely narrowly) separate. Prefrontals usually narrowly separate, rarely widely separate or just touching or forming very short common suture. Frontal usually in contact with first three (sometimes two) supraoculars; usually a little longer (occasionally as long as but never shorter) than combined length of frontoparietals and interparietal; abnormally divided transversely and longitudinally. Frontoparietals usually shorter (occasionally longer) than interparietal. Supraciliaries 7-9. Temporals normally 3, abnormally 4 due either to vertical division of a secondary or to horizontal division of last labial. Upper labials usually 8 with four wholly and fifth partly anterior to orbit; occasionally 7 or 9 due to fusion or division in anterior labials. Enlarged nuchals 0-4. Midbody scales in 28-34 rows; laterals smallest, ventrals largest; dorsals subequal, weakly and obtusely uncarinate or almost smooth. Keels of supracaudals a little stronger and sharper than those of dorsals and similarly aligned longitudinally. Lamellae under fourth toe 21-29 (24.3), divided (except distal 3-10), each semilamella tuberculately keeled (keels strongest proximally, occasionally sharper distally), undivided lamellae smooth or very weakly keeled.

Upper surface pale yellowish brown with 8-13 (9.9) moderately broad, irregular (but sharply defined) dark brown bands across body and 19-29 (22.6) across tail (regenerated tails are uniformly brown); bands as wide as or a little narrower than pale interspaces, sometimes ending at midline or branching to form a Y or X; bands darker in juveniles than adults. Under surface whitish except for palms, soles and under digits, which may be greyish.

Geographic variation. This species is widely distributed in arid and semiarid parts of Western Australia between latitudes 18 and 32° S. There is no geographic variation in colour pattern, and only a slight amount in meristics, proportions and scutation, which, apart from the Kimberley-Pilbara population, only became apparent when the data were broken down geographically.

(1) *Kimberley-Pilbara*: 13 specimens from between Halls Creek and Tambrey. The most distinctive population, and especially characterised by (a) large size (SVL exceeding 100 mm in 7 specimens, whereas no specimen from other populations attains more than 97); (b) reduced keeling (dorsal scales virtually smooth); (c) few nuchals (averaging 0.6 on each side, against 0.9-1.2 in other populations), (d) high frequency of frontoparietals longer than interparietal (45%, against 0% in neighbouring Mid-west Coast and Western Interior populations, and 20-23% in others). Additionally, it shares with Mid-west Coast and Western Interior populations high number of upper labials (mainly 8, occasionally 9, never 7; against mainly 8, occasionally 7, never 9 in others).

(2) *Mid-west Coast*: 8 specimens from between Yardie Creek and Warroora. Especially characterised by low number of midbody scale rows (28-32, av. 30.1; against averages of 30.6-33.3 in others) and relatively strong dorsal keeling.

(3) *Western Interior*: 15 specimens from between the upper Gascoyne and Paynes Find. This population has no peculiarities and is intermediate between the first two, but nearer to the second, with which it shares the distinction of having the interparietal always longer than frontoparietals. Poorly differentiated from South-west and North-east populations.

(4) *South-west*: 20 specimens from Ajana south and east to Narrogin and Woolgangie. Another poorly differentiated population. Limbs relatively shorter and size probably less than in other populations (no specimen has SVL > 86).

(5) *Eastern*: 13 specimens from Wiluna south and east to the Goldfields and Nullarbor Plain. Their main peculiarities are (a) 58% of specimens have only two supraoculars in contact with frontal (against 0-32% in other populations); (b) 23% have frontal not clearly longer than frontoparietals and interparietal together (against 0-12% in others); and (c) more numerous lamellae under fourth toe, viz. 23-29 (25.8), against averages of 22.8-24.5 in others.

(6) *North-east*: 15 specimens from Warburton and Blackstone Ranges. Their only peculiarity is the low number of lamellae under fourth toe, viz. 21-26 (22.8), against averages of 24.0-25.8 in others.

Some of the geographic variation in *S. richardsoni* seems to be clinal, e.g. decrease in absolute size and relative length of limbs from north to south; increase in number of enlarged nuchals from north to south; increase in number of midbody scale rows (and possibly also strength of dorsal keeling) from the mid-west coast through the western interior to peripheral populations; and decrease in number

of upper labials from northwest to southeast. Other characters, like the number of dorsal bands, supraciliaries and subdigital lamellae, and the frequency of frontoparietals longer than interparietal and of two rather than three supraoculars in contact with frontal, vary irregularly, which indicates some regional restriction in gene-flow.

Remarks. While there is clearly some geographic variation in *S. richardsoni*, it is doubtful whether any of it amounts to subspeciation. The only possible exception is the Kimberley-Pilbara population; but before considering this a distinct subspecies, more should be learnt of its relationship to neighbouring populations. No specimen has yet been taken in the 240-mile gap between Tambrey and Yardie Creek or in the 170-mile gap between Woodstock and Mt. Newman. A single specimen from the latter locality differs from Pilbara specimens and agrees with the Mid-west Coast series in its low number of midbody scale rows (29) and relatively strong dorsal keeling. Another difficulty to be resolved before formally recognising the Kimberley-Pilbara population is the questionable type-locality of *richardsoni* (see below).

The Mid-west Coast series, better than any other, fits the original description of *monotropis*; whereas our single topotype from Geraldton (which was grouped above with the South-west population) has weakly keeled dorsals, 34 rows of midbody scales and four auricular granules. This Geraldton specimen is evidently less like the type of *monotropis* than that of *richardsoni*, which brings us to the question of the latter's type-locality.

The type of *richardsoni* was originally stated by Gray as coming from the Houtman Abrolhos. Yet these islands have been worked this century by several expeditions, which have all failed to collect *richardsoni* and several other reptiles and amphibia supposed to occur there (Storr 1965). All of these problematic species have been found on the opposite mainland, and it is possible that the early collectors (generally notorious for their imprecise or erroneous locality data) did not distinguish between insular and continental collections. If in fact *richardsoni* was obtained on the opposite mainland, at or near Champion Bay, it would be an absolute synonym of the junior *monotropis*. The smooth dorsals, possibly correlable with large size, are the greatest difference between the type of *richardsoni* and our Geraldton specimen. If on the contrary it were demonstrable that southern animals never have the dorsals so smooth or attain a snout-vent length of 127 mm, the possibility would have to be considered that the type of *richardsoni* really came from the Pilbara or further north.

At present it would be premature to correct the type-locality of *richardsoni*. Nor will it become urgent to do so, while there is no good reason for formally dividing the western populations.

Two juveniles from Lanbinna (west of Oodnadatta, S.A.) are tentatively placed with *richardsoni* because of their relatively broad

and irregular caudal bands and eight upper labials. Nevertheless they are not very different from Alice Springs specimens of *fasciolatus*, with which they agree in having 12-14 dorsal bands. They share with the Eastern (W.A.) population of *richardsoni* high number of subdigital lamellae (25-26); moreover one of them has only two supraoculars in contact with the frontal, and neither has the frontal clearly longer than frontoparietals and interparietal together. In addition to being intermediate between the Eastern (W.A.) population of *richardsoni* and the Southern (N.T.) population of *fasciolatus*, they are unique in having banded legs.

De Vis separated his *ambiguus* from *richardsoni* because of its "larger scales, shorter body, and longer limbs". His single specimen had 32 rows of midbody scales, and limbs 27 and 38% of SVL (52 mm), which is well within the variation of *richardsoni*. Likewise the 9 dorsal bands "nearly as broad as the intervals" and 27 caudal bands place it with *richardsoni*. Lovridge (1934 : 354) synonymised *ambiguus* with *fasciolatus*, apparently because of his belief that *fasciolatus* and *monotropis* were western and eastern (rather than northern and southern) representatives.

Material examined. *Kimberley Division* (W.A.): SAM 3535 (Moola Bulla, 12 mi. W of Halls Creek); WHB (1) (Mt. Phire, 20 mi. E of Anna Plains). *North-West Division* (W.A.): R 11087 (Abydos); R 13095-6, 13313, 17891-4, 25103-4 (Woodstock); R 1390 (Tambrey); WHB (1), R 13269-70, 15127 (Yardie Creek); R 8212-3, 8232 (Warroora); R 23990 (Mt. Newman); R 6463 (upper Gascoyne); R 15779-81 (Mileura); R 7369 (Belele); R 7368 (Meekatharra); R 1521 (Wurarga); R 4595-6 (Gullewa); R 7513 (Muralgarra); R 13971, 13974 (Burnabinmah); R 12644 (Paynes Find); WHB (1) (12 mi. NE of Rothsay). *South-West Division* (W.A.): R 25218 (Ajana); R 8595 (Geraldton); R 4624 (Koolanooka); R 3848 (Mogumber); R 1502 (Koorda); R 4567, 10187 (Mukinbudin); R 2833 (Nungarin); R 2419-20 (Meckerling); R 2589 (Northam); R 17895 (38 mi. from Perth); R 17900 (Talbert); R 18496 (Boyagin Rock, 10 mi. SW of Brookton); R 8844 (Pingelly); R 17896 (15 mi. E of Pingelly); R 2179 (Wickepin); R 7027 (Narrogin). *Eastern Division* (W.A.): R 20747 (Blackstone Mining Camp); R 14643, 17112, 17745-7, 17855, 22008-10, 22058, 22069-70, 22103, 22200 (Warburton Range); R 6340, 8935 (Wiluna); R 12408, 19768 (Kathleen Valley); R 17897 (Cosmo Newberry); R 1763, 23905 (Laverton); R 12984 (Queen Victoria Spring); R 17898 (6 mi. W of Coonana); R 6390 (Boulder); R 12742-3 (Woolgangie). *Eucla Division* (W.A.): R 17899 (Seemore Downs); R 15210 (Rawlinna). *South Australia*: R 2270 (Ooldea); NTM 1553-4 (Lanbinna).

Sphenomorphus fasciolatus fasciolatus
(Günther)

Hinulia fasciolata Günther, 1867, Ann. Mag. Nat. Hist. (3) 20: 47. Rockhampton and Port Curtis, Queensland (G. Krefft).

Lygosoma (Hinulia) fasciolatum intermedium Sternfeld 1919, Senck. Biol. 1: 81. Hermannsburg, Northern Territory (M. von Leonhardi).

Diagnosis. Moderately large *Sphenomorphus* whose adpressed limbs overlap or fail to meet by less than length of fore-leg. Distinguishable from *S. isolepis* by keeling of supracaudals and dorsal pattern of transverse bars (not of spots); and from *S. richardsoni* by more numerous, less regular and narrower body bands, and more numerous, more regular and narrower caudal bands.

Distribution. Interior of Northern Territory between latitudes 15 and 25°S. southeast and east to coast of central Queensland.

Description. Fore-leg 23-29 (26.3) and hind-leg 33-41 (37.3) % of SVL. Digits moderately long and slender, moderately or weakly compressed; fourth finger slightly longer than third. Tail 1.33-1.42 (1.36) times as long as SVL in five (of 16) specimens with original tail. Ear aperture vertically elliptical or subcircular, about half as large as eye, margined anteriorly with 0-3 granules. Maximum SVL 86.5 mm.

Nasals widely separate. Prefrontals usually moderately (sometimes narrowly, rarely widely) separate. Frontal usually in contact with first three (sometimes two) supraoculars, usually a little longer (occasionally as long as but never shorter) than combined length of frontoparietals and interparietal, abnormally divided horizontally. Frontoparietals about as long as interparietal. Supraciliaries 6-8 (7.2). Temporals normally 3; abnormally 2, due to fusion of primary with upper secondary. Upper labials usually 7, with first three wholly and fourth partly anterior to orbit; occasionally 8, due to division of an anterior labial. Enlarged nuchals 0-2 (0.7) on each side. Midbody scales in 30-36 (32.8) rows; laterals smallest; dorsals subequal, weakly and obtusely uncarinate or smooth. Keels of supracaudals a little stronger and sharper than those of dorsals and similarly aligned longitudinally. Lamellae under fourth toe 18-28 (23.1), weakly divided (except distal 6-13), tuberculately keeled.

Upper surface pale brown with 11-19 (13.5) irregular dark brown bands across body, each 1-2 scales wide and separated by pale interspace of 3-5 scales, often broken mid-dorsally (especially on neck), becoming paler, narrower and deflected forwards on flanks; and with 35-40 (37.6) bands on tail, usually very regular (except first 2-3) and occupying a single transverse row of scales and separated by two rows of pale scales. Under surface whitish except under digits, which may be greyish.

Geographic variation (in Northern Territory). As in *richardsoni*, individual variation is greater than geographic variation. The following division of the material reveals some slight regional differentiation.

(1) *North*: 2 specimens from Larrimah. These have the most numerous dorsal bands (17 and 19), fewest subdigital lamellae (18-22), fewest nuchals (0-1, av. 0.5) and relatively smallest limbs and ear aperture.

(2) *Central*: 7 specimens from between latitudes 20 and 22°S. Dorsal bands 12-16 (13.3). Subdigital lamellae 22-28 (24.9). Nuchals 0-1

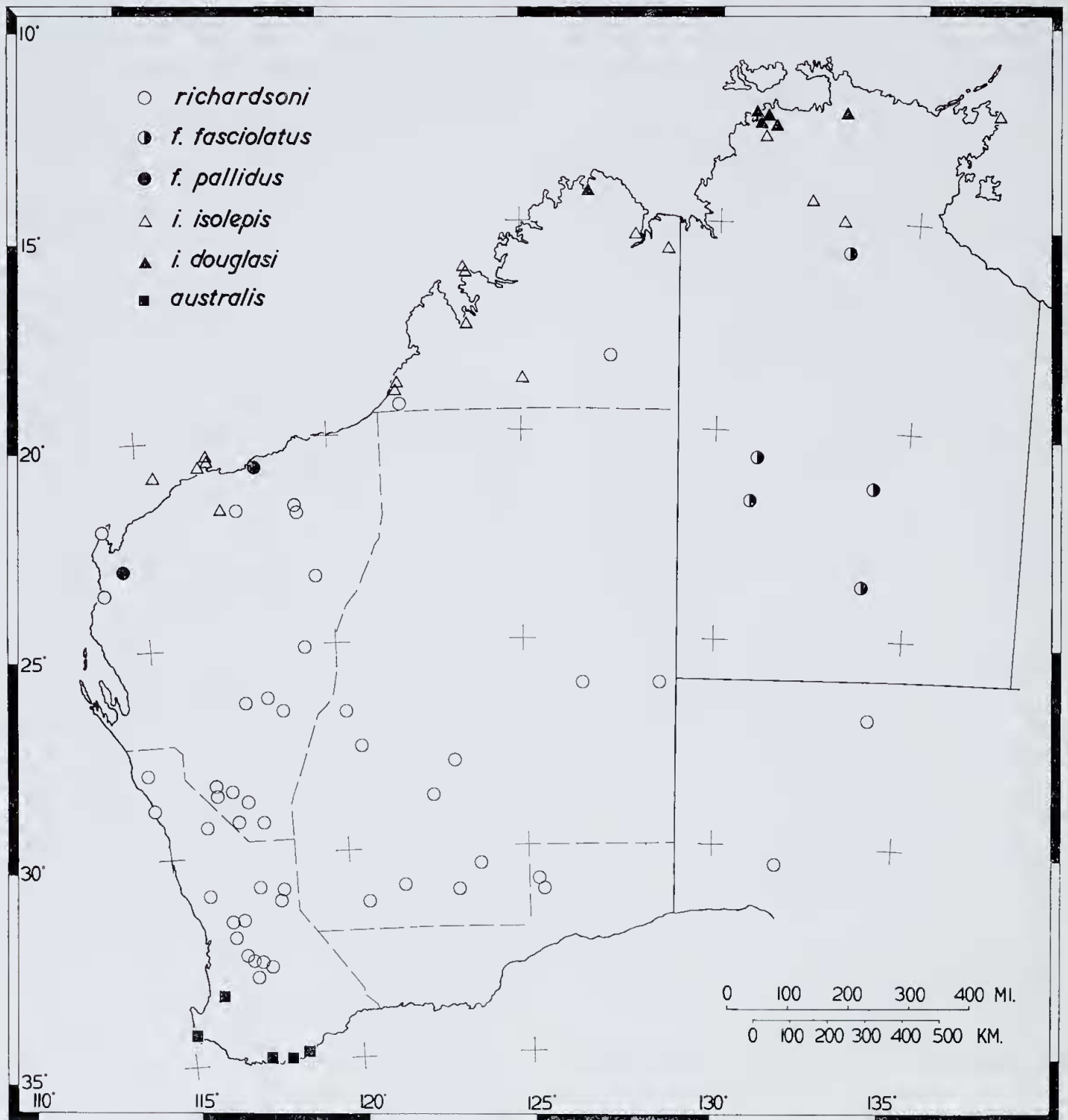


Figure 1.—Map of Western Australia and the Northern Territory showing location of specimens of four species of *Sphenomorphus*.

(0.7). No specimen has frontoparietals longer than interparietal, or upper secondary temporal larger than lower.

(3) *South*: 7 specimens from Alice Springs and vicinity. Dorsal bands 11-14 (12.4). Subdigital lamellae 20-26 (22.3). Nuchals 0-2 (0.9). Four specimens have frontoparietals longer than interparietal. Two specimens have 8 upper labials (invariably 7 in other populations). Banding in one specimen highly irregular on tail as well as body. Only one specimen has an auricular granule (against 2-3 in a third of the individuals of other populations).

Some of the variation seems to be clinal, e.g. north-south decrease in number of dorsal bands and increase in number of nuchals. Other characters vary irregularly, e.g. number of subdigital lamellae. A third class of variation could be due to past introgression of characters from neighbouring taxa, e.g. 8 labials and irregular caudal banding in some southern specimens (from *S. richardsoni*), and small ear aperture and pale, very irregular dorsal banding in the north (from *S. f. pallidus*).

Remarks. Sternfeld (*supra cit.* and 1924) separated "intermedius" from *fasciolatus* because of supposed differences in size, length of appendages and coloration (intermediate between *monotropis* and *fasciolatus* but nearer to latter). He evidently had no comparative material and relied on descriptions and measurements in Boulenger (1887) for his concepts of typical *fasciolatus* and *monotropis*. Admittedly none of his series (SVL 35-83 mm) was as large as the specimen of *fasciolatus* (SVL 98 mm) measured by Boulenger, but the relative length of the latter's fore-leg and hind-leg (28 and 38% of SVL) fall well within the range of Sternfeld's Hermannsburg series (24-31% and 34-43%). The relatively short tail of the specimen measured by Boulenger could have been regenerated; it is certainly so in the specimen figured by Boulenger.

Material examined. Northern Territory: R 24144-5 (4 mi. S of Larrimah); NTM 2083-6 (Tanami Desert Sanctuary, ca 20°35'S, 131°E); NTM 2693, 2758 (Newnans Cave, 21°38'S, 130°50'E); R 24350 (Taylors Well, 26 mi. NE of Barrow Creek); NTM 1539, 2107-8, 2284-5, 2576, 2896 (near Alice Springs).

Sphenomorphus fasciolatus pallidus (Günther)

Hinulia pallida Günther, 1875, in Richardson & Gray's 'Zool. Erebus & Terror' 2: 12. Niekol Bay, Western Australia (F. H. du Boulay).

Diagnosis. Medium-sized *Sphenomorphus* whose adpressed limbs overlap by less than length of hand. Distinguishable from *S. f. fasciolatus* by obscurity of dorsal banding, depressed snout and very small ear aperture.

Distribution. Northwest coastal plains of Western Australia from Mundabullangana southwest to Marilla.

Description. Fore-leg 25% and hind-leg 38% of SVL. Digits weakly compressed; fourth finger slightly longer than third. Ear aperture subtriangular, $\frac{1}{3}$ as large as eye, not margined anteriorly with granules. SVL 69 mm.

Nasals widely separate. Prefrontals moderately separate. Frontal in contact with first two supraoculars; a little longer than combined length of frontoparietals and interparietal. Supraciliaries 7. Temporals 3, primary smallest, upper secondary largest. Upper labials 7; first three wholly and fourth partly anterior to orbit; last two largest, larger than lower secondary temporal. Enlarged nuchals 0-1 on each side. Midbody scales in 34 rows; ventrolaterals smallest; dorsals largest, subequal, smooth. Supracaudals obtusely unicarinate with keels aligned longitudinally. Lamellae under fourth toe 20-21, weakly divided proximally; each semi-lamella tuberculately keeled; middle and distal lamellae with a moderately sharp keel.

Upper surface pale greyish brown, banded with slightly darker brown. Dorsal bands obscure, narrow and highly irregular, more distinct and deflected forwards on flanks where 11 are discernible between axilla and groin. Caudal bands distinct and regular, each occupying one transverse row of scales and separated by pale interspace two-scales wide and bearing a fairly regular line of small spots similar in colour to caudal bands. Under surface whitish.

Remarks. Our material agrees fairly well with Günther's description of the type, but not so well with Boulenger's (1887 : 233) with respect to coloration. Perhaps the specimen had faded in the interval between the two descriptions.

While there is little doubt that our specimens* are identical with Günther's *pallidus*, it is another matter whether *pallidus* is worthy of subspecific rank. The differences between these specimens and some examples of *f. fasciolatus* (especially the smaller of the two Larrimah specimens) are trivial and require confirmation with series.

S. fasciolatus and *S. richardsoni* are much more alike than any other two species dealt with here, and Sternfeld (1919, 1924) and Loveridge (1934 : 354) understandably regarded them as conspecific; but whatever happens in the east, they behave as good species in the west of the continent. The distribution of *S. f. pallidus* is entirely surrounded (if not overlapped) by that of *S. richardsoni*, and it is clear that there is no gene-flow between the two. The bold banding and high labial counts of northern *richardsoni* are quite unaffected by the proximity of *pallidus*.

It is possible that *fasciolatus* and *richardsoni* have different habitat requirements. The latter is largely confined to hilly or rocky country and is commonly found under exfoliating granite. The Mundabullangana specimen of *f. pallidus* (like the Larrimah and Taylors Well specimens of *f. fasciolatus*) was taken at a windmill in plain country. No habitat details are available for the Marilla specimen of *pallidus*, but the country round that station consists of plains and sand dunes.

* One of them, R5336 from Marilla, is evidently lost. However, its coloration as described by Glauert (1961: 73) is similar to that of R17060.

I have been unable to locate the Carnarvon specimen referred by Glauert (1961 : 72) to "*Lygosoma pallidum*."

Material examined. North-West Division (W.A.): R 17060 (9 mi. SW of Mundabullangana).

***Sphenomorphus isolepis isolepis* (Boulenger)**

Lygosoma isolepis Boulenger, 1887, "Cat. Liz. Brit. Mus." 3: 234. Nickol Bay (F. H. du Boulay), Swan River and Australia.

Lygosoma (Hinulia) isolepis foresti [sic] Kinghorn, 1931, Rec. Aust. Mus. 18: 358. Forrest River, Western Australia (L. Wood).

Diagnosis.—Medium-sized, somewhat stout *Sphenomorphus* whose adpressed limbs just overlap (juveniles) or fail to meet (adults). Distinguishable from *S. fasciolatus* and *S. richardsoni* by its intensely spotted colour pattern (especially on sides) and smooth supracaudals.

Distribution. Far north of Northern Territory (east to Yirrkala and south to Mataranka, but excluding extreme northwest); Kimberley Division of Western Australia (mainly near coast, but excluding extreme north); and North-West Division of Western Australia (Dampier Archipelago, Barrow Island, and at Millstream on the Fortescue River).

Description. Fore-leg 18-25 (21.5) and hind-leg 27-35 (31.4) % of SVL. Digits slightly compressed; fourth finger a little longer than third. Ear aperture vertically elliptical, $\frac{3}{4}$ - $\frac{3}{4}$ as large as eye. Tail up to 1.8 times as long as SVL, but usually regenerated. Maximum SVL 83 mm.

Nasals widely separate. Prefrontals widely or narrowly separate, rarely touching. Frontals in contact with first two (rarely 3) supraoculars, about as long as combined length of frontoparietals and interparietal. Frontoparietals slightly longer than interparietal. Supraciliaries 6-8 (mostly 7). Upper labials usually 7 with first four wholly or partly anterior to orbit; rarely 6 or 8 with first three or five anterior to orbit; last two largest, usually smaller than lower secondary temporal. Enlarged nuchals 0-3 on each side. Midbody scales in 25-32 rows; dorsals subequal, smooth. Lamellae under fourth toe 19-25, usually divided (especially proximally), weakly to moderately keeled (proximal keels subtubercular, distal keels sharper).

Upper surface pale to moderately dark, dull or glossy, slightly reddish brown. Dorsum covered with dark brown or brownish black spots, variously shaped but seldom circular, less dense and conspicuous than those on flanks and tending to be arranged longitudinally. Flanks pale brown or white, densely covered with dark brown spots, variously shaped, largest and most conspicuous dorsolaterally. Sutures between labials irregularly (but usually broadly) margined with dark brown. Under surface whitish.

Geographic variation. This series falls on the basis of geography and morphology into three groups:

(1) *North-west (W.A.)*. Maximum SVL 62 mm. Midbody scale rows 28-32 (mostly 30 and 32). Frontal usually a little longer than fronto-

parietals plus interparietal. Supraciliaries 6-8 (mostly 7). Except on Barrow Island, dorsal and lateral spots tend to be transversely elongate, forming short straight or curved bars; they are especially conspicuous on flanks when ground colour is white, as in the Dampier Archipelago. Dorsal and lateral spots in Barrow Island specimens subcircular, relatively sparse on flanks and aligned longitudinally.

(2) *Kimberley (W.A.)* Maximum SVL 66. Midbody scale rows 25-28 (mostly 28). Supraciliaries 6-8 (mostly 7). Limbs relatively shorter than in other regions. Cockatoo Island specimens are very distinctive with their virtually unspotted backs, darkly margined lower labials, and low number of midbody scale rows (av. 26.5).

(3) *Northern Territory*. Maximum SVL 83. Midbody scale rows 28-31 (mostly 30). Frontal usually a little shorter than frontoparietals plus interparietal. Supraciliaries 7 or 8. Temporals more disparate than in other populations; upper secondary seldom larger than lower.

Remarks. Although the above groups of populations probably represent incipient subspecies, there is too much morphological overlap for their nomenclatorial recognition. In coloration the insular populations are much more distinctive than any from the mainland, but in their meristics they generally agree with the continental populations opposite them; which again creates difficulties in recognising subspecies. Another reason for not at present dividing *i. isolepis* is given under the next subspecies.

Our two topotypes of "forresti" agree well with Kinghorn's description. Nevertheless, few if any of the characters relied on by Kinghorn are exclusive to the Forrest River population.

Material examined. Northern Territory: R 13505-6, 13514 (Yirrkala); R 23266 (26 mi. N of Adelaide River); R 14029, 19891-3, 21917-20, 21922, 21930, 24929 (Katherine); R 23795-6 (Mataranka). Kimberley Division (W.A.): R 11974, 22361 (Kimberley Research Station, Ord River); R 12489-90 (Forrest River Mission); R 11743-7, 11805 (Wotjulung); R 14076, 24996-8 (Cockatoo Island); R 20265-6, 20330, 20352 (Derby); R 1255 (Broome); WHB (5) (La Grange); WHB (1) (Frazier Downs); R 168 (St. George Range). North-West Division (W.A.): R 14017, 14249-51 (Dolphin Island, Dampier Archipelago); R 14359, 14364-5 (Legendre Island, Dampier Archipelago); R 14502 (West Lewis Island, Dampier Archipelago); WHB (2) (Barrow Island); R 5012, 20104-9 (Millstream).

***Sphenomorphus isolepis douglasi* subsp. nov.**

Holotype. R 23446 in Western Australian Museum, collected by G. M. Storr and A. M. Douglas on September 16, 1964, at Darwin, Northern Territory, in 12°25'S, 130°49'E.

Diagnosis. Moderately large and stout *Sphenomorphus* whose adpressed limbs overlap or fail to meet by less than length of fore-leg. Distinguishable from *S. i. isolepis* by its greater

size, fewer upper labials and broad blackish dorsolateral streak on neck and anterior part of body.

Distribution. Far northwest of Northern Territory (east to Oenpelli) and extreme north of Western Australia (Napier Broome Bay).

Description. Fore-leg 17-23 (20.6) and hind-leg 26-35 (31.0) % of SVL. Digits not or very slightly compressed; fourth finger a little longer than third. Ear aperture vertically elliptical or circular, about $\frac{3}{4}$ as large as eye. Tail 1.6-1.8 times as long as SVL. Maximum SVL 96 mm.

Nasals widely separate. Prefrontals widely or narrowly separate, rarely touching. Frontal usually in contact with first two supraoculars, rarely with three, abnormally with one (due to fusion of first and second supraoculars); as long as or a little longer than combined length of frontoparietals and interparietal. Frontoparietals longer or shorter than interparietal. Supraciliaries 6-9. Temporals normally 3; lower secondary usually largest; secondary temporals abnormally divided. Upper labials usually 6 with first three anterior to orbit; occasionally 7 with first four anterior to orbit; last two largest, usually smaller than lower secondary temporal. Enlarged nuchals 0-4 (mostly 1) on each side. Midbody scales in 26-32 rows; dorsals smooth. Lamellae under fourth toe 17-25 (21.4), divided (except distally), weakly keeled (proximally in two series with inner keels apical, larger, subtubercular; and outer keels lateral, sharper; distally smooth or feebly uncarinate).

Upper surface dark glossy brown. Dorsal and lateral spotting varying geographically (see below). Irregular but generally broad blackish dorsolateral streak from neck to a little behind insertion of arm, usually dotted with white and extending narrowly and brokenly through orbit to snout. Under surface whitish, except for grey under digits.

Geographic variation. At present this race is only known from two widely disjunct populations, differing as follows:

- (1) *Darwin district (N.T.)*. Maximum SVL 84 mm. Midbody scale rows 27-32 (29.0). Lamellae under fourth toe 18-25 (21.7). Nuchals averaging 1.3 on each side. Supraciliaries 6-8 (6.9). Back sparsely spotted with dark brown. Flanks purplish brown, obscurely flecked with dark brown, sometimes dotted with white (i.e. lateral spotting generally less conspicuous than dorsal).
- (2) *Napier Broome Bay (W.A.)*. Maximum SVL 96. Midbody scale rows 26-28 (27.7). Lamellae under fourth toe 17-23 (20.7). Nuchals averaging 0.3 on each side. Supraciliaries 7 or 8 (7.6). Back obscurely mottled (rarely spotted) with dark brown. Flanks pale brown, spotted or mottled with dark brown (i.e. lateral spotting more conspicuous than dorsal).

Remarks.—This distinctive skink is named after Mr A. M. Douglas of the Western Australian Museum, who had a hand in collecting all except three of the type series.

If, as it seems, *douglasi* is confined to humid habitats, the apparent break in its distribution is probably real, for the country round the head

of Joseph Bonaparte Gulf is relatively dry (annual rainfall 25-30 inches). At any rate part of this area (Forrest River and lower Ord River) is now occupied by the nominate race.

I have not formally separated the two segments of *douglasi*, because such a course would mask the fact that they are much more similar to each other than either is to the nominate race. If reasons were found for elevating *douglasi* to a full species, the way would be open for subdividing not only *i. douglasi* but also *i. isolepis* (which as we have seen breaks up into distinguishable populations). One such reason would be the identification of our R 13630 as *isolepis*. This specimen was collected on the same occasion as the Kalumburu paratypes of *douglasi* but differs strikingly from them. It is very pale, lacks the dorsolateral streak, and has relatively shorter limbs, more subdigital lamellae (25), more nuchals (2+1), more upper labials (7), more supraciliaries (9) and more narrowly separated prefrontals than any other Kalumburu specimen.

Paratypes. Northern Territory: R 23447-8 (Darwin); R 23570 (5 mi. E of Darwin); R 23581 (12 mi. E of Darwin); R 23574 (17 mi. E of Darwin); R 23616-23 (Howard Springs); R 23296 (Berry Springs); R 23267-70 (Southport); R 23288-9 (35 mi. SE of Darwin); NTM 1602 (Beatrice Hills); R 13627 (Oenpelli). *Kimberley Division (W.A.):* R 1567 (Pago); R 13620-5, 13628-9 (Kalumburu).

Sphenomorphus australis (Gray)

new combination

Lygosoma australis J. E. Gray, 1839, Ann. Nat. Hist. 2: 232. Australia.

Hinulia gracilipes Steindachner, 1870, S. B. Akad. Wiss. Wien. 62: 342. "Australia, possibly Rockhampton or Cape York."

Diagnosis. Elongate, weak-limbed, thick-tailed *Sphenomorphus* whose adpressed limbs fail to meet by $1\frac{1}{2}$ - $3\frac{1}{2}$ times length of fore-leg. Distinguishable from *S. crassicaudus* by greater size, white spotting of flanks, larger ear aperture and more numerous circumocular scales.

Distribution. Far southwest of Western Australia from Collie south and east to Cheyne Beach.

Description. Fore-leg 10-16 (13.0) and hind-leg 16-27 (21.4) % of SVL. Digits not compressed; fingers extremely short, fourth scarcely longer than third. Ear aperture vertically elliptical, about $\frac{3}{4}$ as large as eye. Maximum SVL 88.5 mm.

Nasals widely separate. Prefrontals moderately separate, rarely touching. Frontal in contact with first two (rarely 3) supraoculars, shorter than combined length of frontoparietals and interparietal. Frontoparietals as long as or a little shorter than interparietal. Supraciliaries 5-7 (usually 6). Temporals 3, upper secondary much the largest. Upper labials normally 7; first three wholly and fourth partly anterior to orbit; last two largest, intermediate in size between primary and lower secondary temporals; third abnormally divided to give 8 labials. Enlarged nuchals 2-4 (mostly 2 and 3) on each

side. Midbody scales in 19-22 (20.5) rows; vertebrae larger than paravertebrals, smooth. Lamellae under fourth toe 16-23 (20.3), smooth, usually entire, occasionally divided (especially proximally).

Upper surface brown (usually dark, slightly rufous brown; occasionally pale olive brown) spotted with black. Spots on head irregular in shape and distribution. Spots on back mostly concentrated on vertebrae to form two broken mid-dorsal lines. Dorsolateral streak ill-defined, black, spotted with white, usually extending narrowly forward to tip of snout and vaguely back on to tail where it tends to become lateral. Sides of body and tail pale olive grey or greyish brown, flecked with black and white. Lips, sides of face and temples whitish, irregularly blotched with black. Lower surface whitish except under tail which is densely mottled with black; throat occasionally marbled with dark grey.

Geographic variation. The Collie specimen is peculiar in several respects. It is darker than any of our 13 specimens from the south coast and is larger (though only 1 mm longer in SVL than R 19834); has fewer midbody scale rows (19 against 20-22); fewer subdigital lamellae (16 against 18-23); and fewer supraciliaries (5 against 6 or 7).

I have not been able to locate the specimen from the mouth of the Murchison referred to by Glauert (1961 : 77).

Remarks. It is unfortunate that there is a prior (but invalid) combination "*Sphenomorphus australis* (Gray)." The latter is based on *Tiliqua australis*, published by Gray on the same occasion as *Lygosoma australis*. When *Tiliqua australis* was transferred by Peters (1863: 231) to *Lygosoma*, it became a secondary homonym of *L. australis* Gray. The next oldest name for *Tiliqua australis*, viz. *Lygosoma lesueurii* Duméril & Bibron (now *Ctenotus lesueurii*), was used in its stead by Boulenger and others until Loveridge (1934 : 345) attempted to revive the dead name *Tiliqua australis* on the invalid grounds that *australis*, though preoccupied in *Lygosoma*, was not so in *Sphenomorphus*. The combination "*Sphenomorphus australis* (Gray) Loveridge," based on a dead name, has no standing in nomenclature and cannot prejudice a similar but later combination based on the available name *Lygosoma australis* Gray.

Nevertheless it was feared that confusion would ensue from proposing the present combination, for Loveridge's combination is well-known and indeed is currently used by some authors. To avoid confusion, the possibility was explored of using *Hinulia gracilipes* Steindachner instead of *Lygosoma australis* Gray on the ground that the latter was indeterminate. Gray's original and subsequent descriptions could apply to several Australian skinks and his type has evidently been destroyed; for, according to Miss E. M. Noble (*in litt.* 6/vii/65), it was not among the specimens salvaged by the British Museum from the neglected collections of the Chatham Museum (*cf.* Sherborn 1940).

However, I was advised not to reject *Lygosoma australis* Gray but to follow Boulenger (1887: 323) in identifying it with the present taxon, because (1) Boulenger's "Catalogue" is still the standard text on Australian skinks, (2) the period of possible confusion would in all probability be short, and (3) the nomenclature of the taxon could be settled once and for all by the simple expedient of designating a neotype. Accordingly I select R 24980 in the Western Australian Museum as the neotype of *Lygosoma australis* Gray; it was collected by Mr R. P. McMillan on January 16, 1965 at Albany, Western Australia, in 35°02'S, 117°53'E.

Material examined. South-West Division (W.A.): R 22833 (Collie); R 19834, 24868 (Karri-dale); R 4995-6, 11357, 22473, 24971-3 (Denmark); R 6789, 6791, 24980 (Albany); R 18006 (Cheyne Beach).

Sphenomorphus crassicaudus arnhemicus subsp. nov.

Holotype. R 13513 in Western Australian Museum, collected by Mrs E. V. Mildenhall in 1960 at Yirrkala, Northern Territory, in 12°15'S, 136° 52'E.

Diagnosis. Small, elongate, weak-limbed, thick-tailed *Sphenomorphus* whose adpressed limbs fail to meet by 1-2 times length of fore-leg. Distinguishable from *S. australis* by smaller size and ear aperture, lack of white spots on flanks, and fewer circumocular scales; and from all other races of *S. crassicaudus* by having more than 18 lamellae under fourth toe and frontoparietals never shorter than interparietal. Further distinguishable from *S. c. crassicaudus* (A. Duméril) in lacking sharp upper edge to darkening of flanks, from *S. c. punctulatus* (Peters) by immaculate venter and more numerous nuchals, and from *S. c. darwiniensis* nov. in lacking broad dark vertebral stripe.

Distribution. Extreme northeastern Arnhem Land.

Description. Fore-leg 13-16 (13.9) and hind-leg 20-32 (24.8) % of SVL. Digits feebly compressed; fingers extremely short, never exceeding 2 mm, fourth scarcely larger than third. Tail 1.65 times SVL in single specimen with original tail. Ear aperture slightly sunken, usually circular, 2-4 times as large as nostril, $\frac{1}{2}$ - $\frac{2}{3}$ as large as eye. Maximum SVL 56 mm.

Nasals and prefrontals widely separate. Frontal in contact with first two supraoculars, about as long as combined length of frontoparietals and interparietal. Frontoparietals as long as or a little longer than interparietal. Supraciliaries 5-7 (usually 6). Temporals 3, upper secondary largest. Upper labials usually 7 with first three wholly and fourth partly anterior to orbit; penultimate largest and subequal to lower secondary temporal; occasionally 6 labials owing to fusion of two of first four. Enlarged nuchals 3-5 (mostly 4 and 3) on each side. Midbody scales in 20-22 (mostly 22) rows; vertebrae considerably wider than paravertebrals; smooth. Lamellae under fourth toe 19-22 (20.2), undivided, smooth or tuberculately keeled.

Upper surface glossy, slightly rufous, brown; obscurely dotted with dark brown, most densely on tail. Ground coloration gradually paling on sides, with spots becoming larger, darker and much more conspicuous, especially on lips and sides of tail. Under surface pale except for dark palms and soles and dark brown subcaudal spots which tend to be transversely elongate.

Remarks. The Yirrkala specimen (U.S. Nat. Mus. 128611) identified by Mitchell (1955: 397) as *Lygosoma crassicaudum* Duméril is without doubt an *arnhemicus*. The difference in coloration between this specimen and descriptions of *crassicaudus* (including *ornatus* MacLeay) was pointed out by Mitchell and is confirmed by the present series.

Paratypes. Northern Territory: R 24889-96, 24994-5 (Yirrkala).

Sphenomorphus crassicaudus darwiniensis
subsp. nov.

Holotype. R 23624 in Western Australian Museum collected by G. M. Storr and A. M. Douglas on September 18, 1964, at Howard Springs (15 air-miles east of Darwin), Northern Territory, in 12°28'S, 131°03'E.

Diagnosis. Small, elongate, weak-limbed, thick-tailed *Sphenomorphus* whose adpressed limbs fail to meet by 1-2 times length of fore-leg. Distinguishable from *S. australis* and other races of *S. crassicaudus* by broad dark vertebral stripe separated from dark flanks by broad pale paravertebral stripe. Further distinguishable from *S. crassicaudus arnhemicus* by having fewer than 18 lamellae under fourth toe and frontoparietals never longer than interparietal.

Distribution. Far northwest of Northern Territory (south to Adelaide River) and extreme north of Western Australia (Napier Broome Bay).

Description. Fore-leg 12-15 (13.8) and hind-leg 19-27 (24.0) % of SVL. Digits feebly compressed; fingers extremely short, fourth scarcely longer than third. Ear aperture slightly sunken, circular or vertically elliptical, 2-3 times as large as nostril, $\frac{2}{3}$ - $\frac{3}{4}$ as large as eye. Tail 1.5 times as long as SVL in single specimen with original tail. Maximum SVL 58 mm.

Nasals widely separate. Prefrontals widely or narrowly separate. Frontal in contact with first two supraoculars, about as long as combined length of frontoparietals and interparietal. Frontoparietals slightly shorter than interparietal. Supraciliaries 5 or 6 (usually 6). Temporals 3, upper secondary much the largest. Upper labials 7 with first three wholly and fourth partly anterior to orbit, last two subequal largest and intermediate in size between primary and lower secondary temporals. Enlarged nuchals 3 or 4 on each side. Midbody scales in 20 rows, except for one specimen with 21; vertebrales considerably wider than paravertebrales; smooth. Lamellae under fourth toe 15-17 (15.8), undivided, tuberculately keeled.

Top and sides of head uniformly dark glossy brown. Broad dark-brown vertebral stripe covering inner $\frac{3}{4}$ of vertebral scales, tending

anteriorly to be split into two stripes by pale mid-dorsal line. Broad pale-brown paravertebral stripe covering whole of paravertebral scales and outer quarter of vertebrales. Sides of body and tail greyish brown flecked with dark and pale brown, dark dots concentrating superiorly to form dark but indistinct dorso-lateral line. Lips whitish, sutures between labials broadly edged with dark brown. Under surface whitish, except for dark palms, soles and under digits, and sparse dots under tail.

Remarks. The widely disjunct range of this taxon is similar to that of *S. isolepis douglasi*. I know of no parallel in other animals. Birds restricted in Western Australia to the vicinity of Napier Broome Bay are generally distributed in the Northern Territory more widely than these lizards. The owl, *Ninox rufa rufa* (cf. Mees 1964 : 8) may prove exceptional; when unconfirmed sight records are ignored, its known range is much the same as that of *darwiniensis* and *douglasi*.

I have been unable to find the Ord River specimens on which Glauert (1961 : 61) based the inclusion of "*Lygosoma* (*Omolepida*) *punctulatum*" in the fauna of Western Australia. The only specimen so labelled was our *darwiniensis* from Pago.

Paratypes. Northern Territory: R 21975 (Darwin); R 24000 (Snake Creek, 7 mi. N of Adelaide River). Kimberley Division (W.A.): R 955 ("Drysdale River" = Pago, Napier Broome Bay).

Discussion

In his classification of the lygosome skinks Boulenger was less concerned with the establishment of natural groups than with the identification of species; hence the reliance in his keys on a few good "pigeon-holing" characters. One measure of his success is that since the publication of the 'Catalogue' few names have been inadvertently proposed for taxa already described. The obverse side of his work is the instability in nomenclature resulting from the prevailing reluctance of workers to accept his generic classification, especially the extremely broad concept of *Lygosoma*.

Boulenger's subgenera of *Lygosoma* have been variously raised to full genera; but as Malcolm Smith showed, this leads to conceptual difficulties, for Boulenger's subgenera were merely intended as means to identifying species and provide no basis for a natural classification. Smith therefore took the opposite (and logical) course of reducing some of the subgenera to sections and abandoning others altogether. He evidently did not think it possible to divide *Lygosoma* into natural, convenient-sized units, a task that Mittleman courageously undertook.

Mittleman's classification was evidently based on descriptions of species rather than the animals themselves. His choice of characters was thus limited to those mentioned in Boulenger's somewhat meagre accounts. Moreover the characters were not analysed for taxonomic constancy or for phylogenetic significance. Consequently several of his numerous genera, despite

their small size, are not clearly monophyletic. As for the very large genus *Sphenomorphus*, Mittleman himself conceded that it might be composite.

While I am confident that all the Western Australian and Northern Territory species are congeneric, I am not so certain that they are rightly placed in *Sphenomorphus*. In spite of their different habitus, these species are all very similar in scutation, especially of the loreal and circumocular regions, in which respect they are less like the type of *Sphenomorphus* than are the species segregated by Smith and Mittleman in *Otosaurus*. It may therefore prove necessary to revive *Eulamprus* or *Hinulia* for the Australian "Sphenomorphus" and their Papuan relatives.

Apart from generic uncertainty, the trivial names of the Australian species cannot be regarded as final until revision of the numerous eastern forms (begun by Copland 1945) is complete. Nor can my treatment of the western forms be regarded as final. It is still an open question whether *douglasi* and *isolepis* are conspecific, and whether either of them should be subdivided. In the series *richardsoni-fasciolutus-pallidus*, I have drawn the specific boundary between the first two; it may prove to be better placed between the last two.

Acknowledgements

I am grateful to Miss E. M. Noble (Reptile Section, British Museum) for information on the type of *Lygosoma australis* Gray; to Mrs A. Neumann (Librarian, Western Australian Museum) for translating papers from German; to Dr. W. D. L. Ride (Western Australian Museum) for nomenclatorial advice; and to Messrs K. R. Slater (Northern Territory Administration) and F. J. Mitchell (South Australian Museum) for the loan of specimens in their care.

References

- Boulenger, G. A. (1887).—"Catalogue of the lizards in the British Museum (Natural History)" III. (Brit. Mus. (Nat. Hist.): London).
- Copland, S. J. (1945).—Catalogue of reptiles in the Macleay Museum. I. *Sphenomorphus pardalis pardalis* (Macleay) and *Sphenomorphus nigricaudis nigricaudis* (Macleay). *Proc. Linn. Soc. N.S.W.* 70: 291-311.
- Glauert, L. (1961).—"Handbook of the lizards of Western Australia." (W. Aust. Naturalists' Club: Perth).
- Loveridge, A. (1934).—Australian reptiles in the Museum of Comparative Zoology. *Bull. Mus. Comp. Zool.* 77 (6).
- Mees, G. F. (1964).—A revision of the Australian owls (Strigidae and Tytonidae). *Zool. Verh. Leiden* no. 65.
- Mitchell, F. J. (1955).—Preliminary account of the Reptilia and Amphibia collected by the National Geographic Society—Commonwealth Government—Smithsonian Institute Expedition to Arnhem Land (April to November, 1948). *Rec. S. Aust. Mus.* 11: 373-408.
- Mittleman, M. B. (1952).—A generic synopsis of the lizards of the subfamily Lygosominae. *Smithson. Misc. Coll.* 117 (17).
- Peters, W. (1863).—Übersicht der von Hrn. Richard Schomburgk eingesandten Amphibien aus Buchsfelde bei Adelaide in Südaustralien. *Mber. Preuss. Akad. Wiss.* 1863: 228-236.
- Sherborn, C. D. (1940).—"Where is the — Collection?" (Cambridge University).
- Smith, M. A. (1937).—A review of the genus *Lygosoma* (Scincidae: Reptilia) and its allies. *Rec. Ind. Mus.* 39: 213-234.
- Sternfeld, R. (1924).—Beiträge zur Herpetologie Inner-Australiens. *Abh. Senckenb. Naturf. Ges.* 38: 221-251.
- Storr, G. M. (1964).—*Ctenotus*, a new generic name for a group of Australian Skinks. *W. Aust. Nat.* 9: 84-85.
- (1965).—The physiography, vegetation and vertebrate fauna of the Wallabi Group, Houtman Abrolhos. *J. Roy. Soc. W. Aust.* 48: 1-14.